

REMARKS

This is in response to the Office Action dated June 18, 2003. The Office Action first rejects claims 1-2, 9-11, 18-19, 26-29, 36-39 and 46-47 under 35 U.S.C. §102(e) as being anticipated by Magnusson et al., US Patent No. 6,136,524 ("Magnusson"). The Office Action also rejected claims 3-8, 12-17, 20-25, 30-35 and 40-45 under 35 U.S.C. §103(a) as being unpatentable over Magnusson in view of Easton, US Patent No. 5,764,687 ("Easton").

In response to the Office Action, applicants have amended claims 1, 11, 18, 28 and 38. Claims 1-47 remain under consideration.

As is well known in the art, in a CDMA system, the signals of all wireless terminals share a frequency band and are sent together in time. The signals of different wireless terminals are differentiated using spreading codes. Each wireless terminal is assigned a unique spreading code. The signal transmitted from a particular wireless terminal to the base station is combined with the wireless terminal's unique spreading code to generate an encoded signal over a wide band of frequencies.

Magnusson is directed to a method for allocating spreading codes in such CDMA systems in away that makes the maximum number of codes available at a given time for channels of different rates and different spreading factors. The spreading codes are related to each other according to a tree-like structure having levels corresponding to communication channel bandwidths. The method taught by Magnusson includes the steps of: a) setting a search level in a tree-like structure; b) determining whether the search level corresponds to a requested bandwidth for a communication channel; c) if the search level differs from the requested bandwidth, selecting a spreading code at a different level and repeating the previous step until the search level corresponds to the requested bandwidth for the communication channel; d) determining whether a spreading code at the search level is eligible to be allocated to the communication channel; and e) selecting an eligible spreading code for allocation to the communication channel. See, e.g., Magnusson, col. 5 line 61 to col. 6, line 10.

Thus, in other words, Magnusson attempts to achieve a specifically requested bandwidth by iteratively searching for a code in a non-random fashion and assigning that code to a transmission. Magnusson teaches that this method assists in efficiently maximizing the number of available codes to allow more
5 users to be serviced, thus leading to a higher overall bandwidth in the system.

The present invention arises out of the realization that the interference experienced by a wireless terminal in a CDMA wireless communication system is a result of a synergy between the spreading code assigned to the wireless terminal and the particular wireless channel through which the signals of the
10 wireless terminal pass. Thus, by assigning spreading codes to terminals based on the propagation characteristics of the wireless channel, the total interference among the wireless terminals is reduced and performance of the overall wireless communication system is improved.

15 **102(e) Rejection: Magnusson**

The Office Action first rejects claims 1-2, 9-11, 18-19, 26-29, 36-39 and 46-47 under 35 U.S.C. §102(e) as being anticipated by Magnusson. In order for a claim to be anticipated by a reference under 35 U.S.C. §102, all elements of the claim must be taught or disclosed by that reference. Magnusson does not
20 disclose each and every element of the aforementioned claims of the present invention.

As an initial matter, it is noted that claims 1, 11, 28 and 38 have been amended to particularly point out for purposes of clarity that the channel propagation characteristics are determined by “estimating” those characteristics.
25 This is described in detail in the specification. For example, at page 8, lines 4-7, the present application states:

“[t]he joint channel estimator 114 determines” the “channel characteristics as follows. The joint channel estimator 114 estimates the path DOAs ($\theta_{k,1}$) and the propagation delays ($\tau_{k,1}$) by using known subspace-based
30 algorithms.”).

Thus, the amendments to claims 1, 11, 28 and 38 have been made to explicitly state that the channel propagation characteristics are estimated.

At no point in Magnusson are channel propagation characteristics estimated. Instead, as discussed above, Magnusson receives a request for a
5 desired channel bandwidth and then iteratively searches in a non-random manner (i.e., by progressing up a code tree) for the code that will achieve that desired bandwidth with the most efficiency. No estimation of channel characteristics such as path direction of arrival (DOA) or propagation delays is taught, as is claimed in amended claims 1, 11, 28 and 38 in the present
10 application. Accordingly, Magnusson does not teach all the limitations of amended claims 1, 11, 28 and 38 and, therefore, this reference does not anticipate these claims.

Therefore, it is respectfully suggested that these claims 1, 11, 28 and 38 are allowable over Magnusson. It follows that claims 2-10 (dependent upon
15 claim 1), claims 29-37 (dependent upon claim 28), and claims 39-47 (dependent upon claim 38) are all allowable over Magnusson as being dependent upon an allowable base claim.

With regards to claim 18, that claim has been amended to explicitly claim the teaching of the present invention that:

20 the "channel propagation characteristics comprise the direction of arrival of a path of signal transmission and the propagation delays experienced by said signal transmission."

25 However, at no point in Magnusson are these channel propagation characteristics (the direction of arrival of a path of signal transmission and/or the propagation delays experienced by that transmission) received and used in assigning spreading codes to a wireless transmission. Therefore, claim 18 is not anticipated by the teachings of Magnusson. Therefore, it is respectfully
30 suggested that claim 18 is allowable over Magnusson. It follows that claims 19-27 (dependent upon claim 18) are all allowable over Magnusson as being dependent upon an allowable base claim.

For the foregoing reasons, it is respectfully requested that the rejection of claims 1-2, 9-11, 18-19, 26-29, 36-39 and 46-47 over Magnusson be removed and that claims 1-47 be allowed.

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103(a) Rejection: Magnusson in view of Easton

10 The Office Action next rejects claims 3-8, 12-17, 20-25, 30-35 and 40-45 under 35 U.S.C. §103(a) as being unpatentable over Magnusson in view of Easton. As discussed above, claims 1, 11, 18, 28 and 38, upon which the above claims depend, have been amended to more particularly point out either that 1) the channel characteristics are estimated according to the claimed features of the present invention; or 2) the channel characteristics comprise the signal path direction of arrival and/or the signal propagation delay. Claims 3-8, 12-17, 20-25, 30-35 and 40-45 remain under consideration in regards to this rejection.

15 In order for an invention to be obvious under 35 U.S.C. §103(a), there must be some suggestion to combine or modify cited prior art references in a manner that would show or suggest the claimed invention. For the reasons discussed below, the Office Action fails to show that the invention as claimed is obvious over Magnusson in view of Easton.

20 As discussed above in association with the rejection under 35 U.S.C. §102(e), Magnusson does not teach the element of estimating the channel propagation characteristics (claims 1, 11, 28 and 38). Nor does this reference teach that the channel propagation characteristics comprise direction of arrival of a signal transmission path and/or the propagation delay experienced by that signal transmission (claim 18). Additionally, there is no suggestion within
25 Magnusson to modify any prior art reference in such a way that teaches these claim elements. Thus, for an obviousness rejection to be proper, these features must either be taught in Easton or, alternatively, Easton must suggest a modification to Magnusson or Easton that would teach the claim features to one
30 skilled in the art.

Easton teaches a method and apparatus for demodulating a signal in a spread spectrum multiple access communication system employing a pilot forward link. A single time-shared multiply-accumulate (MAC) datapath services a plurality of finger front ends and a searcher front end in the process of
5 producing a demodulated symbol stream and a power control stream that are, in turn, used to control the transmit power on the reverse link. **See Easton, col. 7, lines 40-51.**

As is the case with Magnusson, at no point does Easton teach the claim element of estimating the channel propagation characteristics (as claimed in
10 claims 1, 11, 28 and 38 of the present application). Nor does Easton teach that the channel propagation characteristics comprise direction of arrival of a signal transmission path and/or the propagation delay experienced by that signal transmission (as claimed in claim 18 of the present application). Additionally, there is no suggestion within Magnusson to modify any prior art reference in such
15 a way that teaches these claim elements. Accordingly, independent claims 1, 11, 28 and 38 are allowable as amended. It follows that claims 3-8, 12-17, 20-25, 30-35 and 40-45 are allowable as being dependent upon allowable base claims.

Regarding claims 3-5, 12-14, 20-22, 30-32 and 40-42, the Office Action cites col. 20, lines 54-64 as teaching the element missing from Magnusson of
20 "searching to obtain an improved code for the target wireless terminal which is an improvement over a current code of the target wireless terminal." Applicants respectfully disagree that this passage of Easton teaches this element. The Office Action accurately quotes the very technical description of the search algorithm recited in the above passage. However, this search pattern is not used
25 to obtain an improved code for the target wireless terminal. Instead, as taught by Easton, this searcher algorithm is used to search windows of offsets likely to contain multipath signal energy peaks suitable for assignment to the fingers for demodulation. These energy peaks found by the searcher is then relayed to a microprocessor and a finger that is unassigned or that is tracking a weaker signal
30 path is assigned by the microprocessor to the offset if that offset has a stronger signal path as identified by the searcher. **See Easton, col 8, lines 39-51.**

Therefore, the searcher and, more particularly, the searcher algorithm cited by the Office Action in column 20 of Easton, is not used to assign symbols as is asserted by the Office Action. Instead, this algorithm is used in demodulation operations only to assign to fingers offsets having relatively higher energy than other offsets. Applicants fail to understand how such a search algorithm for higher energy levels relates to the assignment of spreading codes to wireless terminals. In any event, this passage does not teach the element as relied upon by the Office Action ("searching to obtain an improved code for the target wireless terminal which is an improvement over a current code of the target wireless terminal"). The Office Action admits that Magnusson does not teach this element. Therefore, it follows that neither reference (Magnusson or Easton) teaches the element. Accordingly, the Office Action has not made out a proper prima facie case of obviousness. There is no teaching in either reference of the above claim element and there is no suggestion to modify or combine the teachings of these references with any other reference to teach this element.

Therefore, applicants respectfully assert that the obviousness rejection of claims 3-5, 12-14, 20-22, 30-32 and 40-42 is improper as the element "searching to obtain an improved code for the target wireless terminal which is an improvement over a current code of the target wireless terminal" is not taught in either Magnusson or Easton. Additionally, there is no suggestion in either reference to modify the references or combine them with any other reference to teach this element. Accordingly, claims 3-5, 12-14, 20-22, 30-32 and 40-42 are allowable for this additional reason. Applicants respectfully request that the present rejection of these claims be removed and that these claims be allowed.

Regarding the rejections to claims 6, 15, 23, 33 and 43, the Office Action admits that Magnusson does not teach "performing a gradient search in the signal space area surrounding the improved code. Additionally, regarding the rejections to claims 7, 16, 24, 34 and 44, the Office Action also admits that Magnusson does not teach that the searcher algorithm discussed above is a "gradient search of the transmission delays for the improved code." The Office Action, however, states that Easton teaches these elements because Easton's

system searches all areas of the signals by search windows” (as claimed in claims 6, 15, 23, 33 and 43) and “inherently performs a gradient search of transmission delays for the improved code” (as claimed in claims 7, 16, 24, 34 and 44). Applicants respectfully disagree. As discussed above, the searcher in Easton does not serve the purpose of assigning spreading codes to a plurality of wireless terminals to detect peak energy levels to facilitate demodulation of a signal stream. Indeed, these searches have no purpose in assigning codes to a wireless terminal nor are they associated with searches of the transmission delays associated with an improved code or the signal space surrounding the improved code as claimed in the above-referenced claims. Thus, neither Easton nor Magnusson teach these elements. Additionally, there is no suggestion in either reference to modify either of the references or combine them with any other reference to teach this element. Accordingly, claims 6, 7, 15, 16, 23, 24, 33, 34, 43 and 44 are allowable for this additional reason. Therefore, applicants respectfully request that the present rejections of these claims be removed and that these claims be allowed.

Regarding claims 8, 17, 25, 35 and 45, the Office Action states:

“[T]he combination limitations of claims 6-7 into claim 8, 15-16 into claims 17, and so on, therefore, these claims are rejected based on rejected claims 6-7, 15-16 into claims 17, and so on, therefore, these claims are rejected based on rejected claims 6-7, 15-16, 23-24, 33-34 and 43-44.”

The meaning of this statement is unclear to applicants. As discussed previously, claims 8, 17, 25, 35 and 45 are allowable as being dependent upon allowable base claims 1, 11, 18, 28 and 38, respectively. If the Office maintains that a proper rejection exists in the above-quoted passage, applicants respectfully request that a clarification to this rejection be provided.

Summary

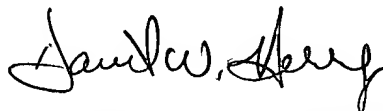
Claims 1, 11, 18, 28 and 38 have been amended. No new matter has been introduced as a result of these amendments. For example, estimating the

propagation characteristics of the channel is taught, illustratively, at page 8, lines 6-7 of the present application. Similarly, support for the claimed feature that the channel propagation characteristics comprise direction of arrival of a signal transmission path and/or the propagation delay experienced by that signal transmission can be found at least at page 8, lines 1-10.

For the foregoing reasons, claims 1, 11, 18, 28 and 38 are not anticipated by Magnusson and, therefore, these claims are allowable. Accordingly, dependent claims 2-10, 12-17, 29-37 and 39-47 are allowable as being dependent upon allowable base claims. Claims 3-8, 12-17, 20-25, 30-35 and 40-45 are also allowable for the additional reason that neither Magnusson nor Easton teach one or more elements in those claims nor do those references suggest modifying or combining the teachings of those references in a way that discloses all the claimed elements in those claims. Therefore, it is respectfully suggested that the obviousness rejection of claims 3-8, 12-17, 20-25, 30-35 and 40-45 is improper and that these claims are allowable for this additional reason. It is therefore requested that the rejection of these claims be removed.

In light of the foregoing, allowance of all claims remaining under consideration is respectfully requested.

Respectfully,



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Date: 10/20/2003

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